

Telescope Spacer Design Investigations

Josep Sanjuan, Ruven Spannagel, Danila Korytov, Guido Mueller

University of Florida

Jeffrey Livas, Alix Preston, Petar Arsenovich

NASA Goddard Space Flight Center

Space-based interferometric gravitational wave observatories will measure changes in the distance between free falling proof masses inside widely separated spacecraft with pm sensitivity. These observatories will use fast telescopes to exchange laser beams. These telescopes are part of the probed optical distances and any length change in the gravitational wave band between secondary and primary can limit the sensitivity of the observatories. Furthermore, the large distance between and space constraints on the spacecraft require to use very fast telescopes with f-numbers approaching unity. These telescopes are very sensitive against any absolute length change which would reduce interferometer visibility and, ultimately, sensitivity. Our group has assembled a Silicon Carbide test structure and investigated its dimensional in the 10^{-4} to 1Hz frequency band at different operating temperatures. We also measured the overall length change and started investigating asymmetric length changes during cool down which would lead to misalignments in the telescope. This work is supported by NASA grant NNX10AJ38G.